flexible substrate such that light is emitted by those devices outwardly and away from the flexible substrate. It appears that the Examiner's position is that Parker discloses an array of light emitting devices, and that Ishibashi discloses light being emitted in a direction equivalent to that recited in the claims, and thus, he concludes that it would have been obvious to combine the references to achieve applicants' claimed invention. However, neither Parker nor Ishibashi discloses an equivalent array to that defined in applicants' claims, and thus, no combination of the cited art achieves the recited invention.

Applicants have positively recited that the *orthogonal* array is *mounted on a flexible substrate*. Ishibashi does not disclose an *orthogonal* array, but instead, merely teaches a plurality of light emitting devices aligned in a *linear* pattern. Parker discloses an orthogonal array, however, the orthogonal array disclosed by Parker *is not mounted on a flexible substrate*. FIGURE 4 of Parker illustrates this distinction clearly. As shown therein, a plurality of orthogonal arrays are indicated by element 31, but these orthogonal arrays are clearly disposed *behind* and not attached to flexible panel assemblies 24 and 26. FIGURE 4 also clearly shows that flexible panel assemblies 24 and 26 each include light sources 9 mounted to the panel assemblies, but light sources 9 *are not disposed* in any orthogonal array. Thus, even if the combination suggested by the Examiner is made, the result will not be a flexible substrate upon which a plurality of light emitting devices arranged in an orthogonal array are mounted such that light emitted by the devices is directed outwardly and away from the flexible substrate, as recited in applicants' claims. Accordingly, the rejection of Claims 1, 2, 4, 8, 12 and 25 should be withdrawn.

Referring now to Claim 23, applicants note that Claim 23 positively recites a flexible substrate having an upper and a lower surface, the lower surface being mounted to a vehicle, and that an array of light emitting devices are mounted to the upper surface of the flexible substrate, such that light emitted from the array is directed outwardly and away from the flexible substrate. The Examiner asserts that Parker can be modified in view of Ishibashi to achieve an equivalent invention. However, upon careful review of the recited elements and a comparison to the disclosure of the cited art, it is apparent that no combination of Parker and Ishibashi can achieve the recited invention. Ishibashi and Parker each discloses flexible substrates; however, neither of the flexible substrates disclosed in the prior art is equivalent to the recited flexible substrate in applicants' Claim 23.

As noted above, the recited flexible substrate of this claim comprises a lower surface mounted to a vehicle, and an upper surface to which is mounted an array of light emitting devices emitting light upwardly and away from the flexible substrate. The flexible substrate of Parker, shown in FIGURE 3 of this reference, is mounted to a vehicle, and does include a plurality of light emitting devices. Furthermore, the surface of the flexible substrate that is mounted to the vehicle is not opposite the surface to which the light emitting devices are mounted, but instead, the surface of the

flexible substrate that is mounted to the vehicle is disposed at right angles to the surface on which the light emitting devices are mounted. Referring specifically to panel 26 in Parker, if light sources 9 are mounted to the upper surface of the flexible substrate, then it is a side surface of the substrate, not the lower surface, that is mounted to the vehicle. Similarly, if one were to define the surface of the flexible substrate mounted to the vehicle in Parker as its lower surface, then the light devices are mounted to a side surface. Applicants' claim positively recites upper and lower surfaces, and there is no logical basis for interpreting that language so as to conclude the upper and lower surfaces are disposed at right angles to each other, rather than being disposed opposite each other.

Note that Ishibashi does not disclose an equivalent flexible substrate, either. Referring to FIGURE 1 of Ishibashi, it is apparent that light emitting diodes 11 are placed upon upper half 4 of the flexible substrate, and then lower half 5 of the flexible substrate is folded over upper half 4, sandwiching the light devices between the two halves. No surface of Ishibashi's flexible substrate is mounted to a vehicle. Ishibashi's entire flexible substrate is encapsulated in a holding body 14 (see in particular FIGURE 7), and thus, no surface of Ishibashi's flexible substrate is mounted to anything other than the holding body and light emitting diodes. Accordingly, no combination of the flexible substrates of Ishibashi and Parker can achieve the recited flexible substrate of applicants' claim, without significant modification, which lies outside the scope of the disclosure of the cited art. Accordingly, the rejection of Claims 23 and 24 should be withdrawn.

Claim 26 positively recites a flexible substrate having a rear surface, a front surface, and a plurality of edges, such that a surface area of both said rear surface and said front surface are each individually substantially larger than a surface area of any of said edges, and a plurality of solid-state light emitting devices mounted in a high density array on the front surface of the flexible substrate, said high density array having a size and shape substantially similar to a size and shape of the front surface of the flexible substrate is covered by the plurality of solid-state light emitting devices, the plurality of solid-state light emitting devices emitting light outwardly and away from the front surface of the flexible substrate. No combination of the flexible substrates of Ishibashi and Parker can achieve the flexible substrate recited in Claim 26.

Parker discloses flexible substrates in which the light sources are mounted along the edges of the flexible substrates, rather than on a front surface. Note that arrays 31 are not mounted to the flexible substrate at all, but instead are disposed *behind* the flexible substrates. Light sources 9 are always mounted along the edges (surfaces having smaller surfaces areas than the front or rear). It is not surprising that Parker discloses mounting light sources along the edges, as that configuration is a critical feature of Parker's invention. By using optically transmissive substrates in Parker, light is directed into the substrate from an edge, causing substantially the entire upper and lower surfaces of the substrate to glow (except where the substrate is masked). In contrast, substantially the entire

upper surface of applicants substrate is illuminated, because a high density array of light emitting devices are mounted over substantially the entire upper surface of the substrate, and these devices emit light outwardly and away from the substrate.

With respect to Ishibashi, the array of light emitting diodes are sandwiched between upper and lower halves (which are folded over each other along line 3). The light emitted from the light emitting diodes in Ishibashi is not emitted outwardly and away from the upper and lower halves, but instead, is emitted outwardly and away from an edge of the flexible substrate (note the position of lens 13 in FIGURE 1). The edge of the flexible substrate closest to lens 13 cannot be equivalent to applicants' recited upper surface, because that edge has a substantially smaller surface area than upper and lower halves 4 and 5.

Accordingly, no combination of Ishibashi and Parker can provide a flexible substrate having a rear surface, a front surface, and a plurality of edges, such that a surface area of both said rear surface and said front surface are each individually substantially larger than a surface area of any of said edges, and a plurality of solid-state light emitting devices mounted in a high density array on the front surface of the flexible substrate, said high density array having a size and shape substantially similar to a size and shape of the front surface of the flexible substrate, such that substantially all of the front surface of the flexible substrate is covered by the plurality of solid-state light emitting devices, the plurality of solid-state light emitting devices emitting light outwardly and away from the front surface of the flexible substrate without significant modification. But the required modification is not disclosed or suggested by the cited art. Accordingly, the rejection of Claims 26 should be withdrawn.

Furthermore, for the following additional reason, the rejection of independent Claims 1, 23, 25, and 26 should be withdrawn. As noted above, a fundamental required principle of operation in Parker is directing light inwardly into an optically transmissive substrate, thereby causing substantially the entire upper and lower surfaces of the substrate to glow (except where the substrate is masked). Each of applicants' independent claims positively recites mounting light emitting devices to a flexible substrate so that light is emitted outwardly and away from the substrate. To modify Parker to achieve an equivalent applicants' claimed invention requires fundamentally changing the required mode of operation disclosed by Parker. Light devices 9 and array 31 of Parker direct light into a light transmissive flexible substrate. None of the light devices disclosed by Parker emit light outwardly and away from the substrate. Note that if a non-light transmissive flexible substrate were to be used in Parker's device, all light would be blocked. If the same non-light transmissive flexible substrate were to be used in applicants' device, no light would be blocked, because no light is directed into the flexible substrate.

MPEP 2143.01 states that the proposed modification cannot change the principle of operation of a reference (entire citation reproduced below).

If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959) (Claims were directed to an oil seal comprising a bore engaging portion with outwardly biased resilient spring fingers inserted in a resilient sealing member. The primary reference relied upon in a rejection based on a combination of references disclosed an oil seal wherein the bore engaging portion was reinforced by a cylindrical sheet metal casing. Patentee taught the device required rigidity for operation, whereas the claimed invention required resiliency. The court reversed the rejection holding the "suggested combination of references would require a substantial reconstruction and redesign of the elements shown in [the primary reference] as well as a change in the basic principle under which the [primary reference] construction was designed to operate." 270 F.2d at 813, 123 USPQ at 352.).

Just as modifying a rigid seal to achieve a resilient seal is impermissible if such a change fundamentally changes the principle of operation disclosed in a cited reference, modifying Parker to achieve light emitting devices disposed to emit light outwardly and away from a flexible substrate on which the light devices are mounted is impermissible, because such a modification fundamentally changes the principle of operation of Parker (which requires that light be directed inwardly into the flexible substrate on which the light devices are mounted). For this additional reason, the rejection of Claims 1, 2, 4, 8, 12, 23, 25, and 26 as obvious over Parker in view of Ishibashi should be withdrawn. Independent Claim 13 Rejected Under 35 U.S.C. § 103(a)

The Examiner has rejected Claim 3 under 35 U.S.C.§ 103(a) as being unpatentable over Parker (previously cited) in view of Duarte (previously cited). The Examiner has further rejected Claims 5, 7, 13-17, 19, 20 and 22 under 35 U.S.C.§ 103(a) as being unpatentable over Parker (previously cited) in view of Ishibashi (U.S. Patent No. 5,931,577), further in view of Gustafson (previously cited). Further, the Examiner has rejected Claims 10 and 11 under 35 U.S.C.§ 103(a) as being unpatentable over Parker (previously cited) in view of Parkyn (previously cited). Claims 18 and 21 are rejected under 35 U.S.C.§ 103(a) as being unpatentable over Parker (previously cited) in view of Gustafson (previously cited), and further in view of Parkyn (previously cited). Applicants respectfully disagree with each of these rejections for the following reasons.

Claims 3, 5, 7, 10 and 11 are patentable over the combination of references cited for at least the same reasons as Claim 1, which is patentable for the reasons noted above. Claims 14-17, 18, 19, 20, 21, and 22 are patentable for at least the same reasons as Claim 13, which is patentable for at the reasons noted below.

With respect to Claim 13, the Examiner admits that Parker does not disclose the recited conductive traces in the flexible substrate, and relies on Gustafson for teaching such elements.

Applicants note that Claim 13 positively recites a plurality of solid-state light emitting devices spaced apart over at least a defined portion of an outer surface of the flexible substrate and mounted thereto, such that the plurality of solid-state light emitting devices emit light outwardly and away from said flexible substrate. Claim 13 also positively recites that the flexible substrate is sized and shaped to cover a portion of a vehicle's exterior.

Referring to Gustafson, the disclosed flexible substrate is fully encapsulated in a protective polymer, which is then placed into a protective track. The polymers suggested by Gustafson are noted for their strength, not their flexibility. The completed assembly is designed to be rugged and durable, and is not flexible. Thus, Gustafson's flexible substrate cannot be considered to sized and shaped to cover a non planar portion of a vehicle's exterior.

The Examiner asserts that Gustafson explicitly discloses a flexible light panel for use on **non planar** surfaces, citing to column 10 lines 12-18. That section is reproduced below, along with related text.

It is contemplated that the light strip according to the above described embodiments of the present invention has application in a wide variety of environments. The following includes several of these contemplated applications although the following is not intended to be an exhaustive list.

The light strip has application in a traffic control environment, such as:

Aircraft guidance lighting; ground vehicle guidance lighting; chasing-effect guidance lighting from runway to arrival gate; red/green traffic control lighting across active runaways; taxiway numbering; directional sign outline lighting; smart sensor-activated lighting for traffic control; temporary barrier demarkation; high hazard permanent marking; traffic impedance marking (i.e., dangerous bridge abutments, narrow zones, etc.); active road signs; left turn/right turn guidance strip; contra-flow control with directional LEDs; difficult intersection control; high fog area line markers; inclusion of smart sensors for traffic control; toll booth control lighting; mobile control signs; traffic light replacement bulb fixture; pedestrian crossing lighting; pedestrian crossing island lighting; road signs (i.e., stop signs, etc.); and road triangles.

The light strip of the present invention also has various automotive applications, such as: truck running lights; truck decorative panels; truck side panel turn indicators; car/truck running board lights; visibility lights for police cars; airplane aisle lighting; train aisle lighting; bus aisle lighting; ship markings; trailer hitch lights; lighting for vehicle docking bays.

In addition, the light strip of the present invention has many structural applications, such as: helicopter pads; well deck indicator lighting; gangway lighting; mobile platform lighting; ladder lighting; night vision lighting; dock lighting; architectural outlining; marina/dock demarkation; passenger control on platforms; theater aisle lighting; restaurant aisle lighting; nightclub lighting;

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stage and theater guidance lighting; hospital directional guidance lighting; factory demarkation for fork lift loaders; step and entrance lighting; auditorium aisle lighting; swimming pool game lighting; Christmas lighting; toyimplemented lighting; bicycle lighting; sports training device lighting; ski trail lighting; landscape design-related lighting; fountain lighting; antenna lighting; camping lighting; tent lighting; and party canopy lighting (column 9, line 56 to column 10, line 33).

While the Examiner correctly notes that Gustafson indicates an expected use of the disclosed light strip includes vehicular applications, the Examiner improperly asserts that Gustafson discloses a flexible light strip for mounting to non planar surfaces of a vehicle. None of the uses described by Gustafson suggests mounting the light strip to a non planar surface. Merely because a vehicle may include planar and non planar surfaces is not a justification for the Examiner to assert that Gustafson describes mounting his light strips to a non planar surface of a vehicle. Every single application noted above in the quote from Gustafson can be achieved by mounting light strips to non planar surfaces. In particular, "truck running lights; truck decorative panels; truck side panel turn indicators; car/truck running board lights; visibility lights for police cars" do not require mounting a substrate to a non planar surface. Many vehicles exist that have exterior planar surfaces, so the ability to conform to a non planar surface is not required to employ the disclosed invention of Gustafson for truck running lights; truck decorative panels; truck side panel turn indicators; car/truck running board lights; and visibility lights for police cars. A rigid and substantially inflexible light strip, such as described by Gustafson, can be used in all those application by being mounted on a substantially planar surface Further, many of the applications specified by Gustafson pertain only to planar surfaces, such as runways, taxiways, ladder lighting, road signs (i.e., stop signs, etc.), and road triangles.

As discussed above, Parker discloses light devices disposed to emit light into a optically transmissive flexible substrate, and thus, Parker does not disclose light emitting devices that emit light outwardly and away from the flexible substrate. Also as noted above, any attempt to combine Parker with a prior art reference that does disclose light emitting devices designed to emit light outwardly and away from a flexible substrate is impermissible per MPEP 2143.01, which states that the proposed modification cannot change the principle of operation of a reference. The combination suggested by the Examiner impermissibly attempts to change the principle of operation of Parker (light emitted *into* a flexible substrate). Because Gustafson does not disclose a light bar adapted to be used with non planar surfaces, and Parker may not be modified so that its principle of operation is changed, the rejection of Claim 13, and all claims depending from Claim 13, should be withdrawn.

Rejection of Independent Claim 23 under 35 U.S.C. § 103(a)

The Examiner has rejected Claim 23 under 35 U.S.C.§ 103(a) as being unpatentable over Gustafson (previously cited) in view of Parker (previously cited) and Ishibashi (U.S. Patent

No. 5,931,577). The Examiner has further rejected Claim 24 under 35 U.S.C.§ 103(a) as being unpatentable over Gustafson (previously cited) in view of Parker (previously cited), further in view of Duarte (previously cited). Applicants respectfully disagree with this rejection for the following reasons.

Independent Claim 23 recites a method for providing external lighting to a vehicle, comprising the steps of providing a flexible substrate having an upper surface and a lower surface, mounting an array of light emitting devices in a spaced-apart array on the upper surface of the flexible substrate, so that light is emitted outwardly and away from the flexible substrate, protecting the light emitting devices with a flexible, generally light transmissive cover, and attaching the lower surface of the flexible substrate to an external surface of the vehicle, so that the flexible substrate and the flexible generally light transmissive cover conform to even a non-planar shape of the external surface.

The Examiner asserts that Gustafson discloses the recited method except for attaching the flexible substrate to an external surface so the substrate and cover conform to non-planar surfaces, but that Parker discloses such a step. Applicants respectfully submit that Gustafson does not disclose protecting a plurality of light sources with a *flexible*, *generally transmissive light cover*. In fact, even though the substrate of Gustafson may be flexible, the balance of the elements of Gustafson's device are not flexible, and a stated purpose of Gustafson's invention is to provide a rugged and durable light strip *that is not flexible*. Gustafson most emphatically *does not* state that a purpose of his invention is to provide a flexible light strip that can conform to a non planar surface. At column 1, lines 37-66, Gustafson clearly discloses that a mechanically strong protective "sheath" is preferred. Note that with respect to the encapsulating material, Gustafson specifically discloses that the encapsulant must be "durable and capable of withstanding considerable loads" (column 4, lines 20 and 21). A material that is durable and capable of withstanding considerable loads is generally not considered to be a flexible material, unless the material is specifically selected for both structural strength *and* flexibility. Clearly, Gustafson fails to teach or suggest that the encapsulant is *flexible*.

Also, Gustafson teaches that the flexible substrate and the light transmissive mechanically strong encapsulant are placed into a rigid track (i.e., aluminum, column 4, line 60) for additional durability. Based on Gustafson's disclosure it is not reasonable to conclude that Gustafson teaches a flexible device that can conform to a non planar surface, or that the reference suggests a flexible, light transmissive cover. Indeed, Gustafson explicitly describes using his device on planar surfaces (airport taxiways and highways, column 5, line 8), and as noted above, none of the applications described by Gustafson require securing the light bar to a non planar surface.

The Examiner appears to suggest that because Parker discloses a flexible protective lens/film 34, it would have been obvious to employ the flexible lens/film of Parker in lieu of the

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mechanically strong encapsulant of Gustafson, to achieve the recited invention. However, Gustafson teaches away from such a modification, because the primary goal of Gustafson is to provide a mechanically strong light strip to attach to planar surfaces. The flexible lens/film of Parker would not provide a mechanically strong light strip as required by Gustafson, and thus, such a modification would not be obvious. Similarly, the stated utility of Gustafson is to provide a rugged light strip, and the suggested modification is impermissible per MPEP 2143.01, which states that the proposed modification cannot render the prior art unsatisfactory for its intended purpose (entire citation reproduced below).

If [the] proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) (Claimed device was a blood filter assembly for use during medical procedures wherein both the inlet and outlet for the blood were located at the bottom end of the filter assembly, and wherein a gas vent was present at the top of the filter assembly. The prior art reference taught a liquid strainer for removing dirt and water from gasoline and other light oils wherein the inlet and outlet were at the top of the device, and wherein a pet-cock (stopcock) was located at the bottom of the device for periodically removing the collected dirt and water. The reference further taught that the separation is assisted by gravity. The Board concluded the claims were prima facie obvious, reasoning that it would have been obvious to turn the reference device upside down. The court reversed, finding that if the prior art device was turned upside down it would be inoperable for its intended purpose because the gasoline to be filtered would be trapped at the top, the water and heavier oils sought to be separated would flow out of the outlet instead of the purified gasoline, and the screen would become clogged.)

"Although statements limiting the function or capability of a prior art device require fair consideration, simplicity of the prior art is rarely a characteristic that weighs against obviousness of a more complicated device with added function." *In re Dance*, 160 F.3d 1339, 1344, 48 USPQ2d 1635, 1638 (Fed. Cir. 1998) (Court held that claimed catheter for removing obstruction in blood vessels would have been obvious in view of a first reference which taught all of the claimed elements except for a "means for recovering fluid and debris" in combination with a second reference describing a catheter including that means. The court agreed that the first reference, which stressed simplicity of structure and taught emulsification of the debris, did not teach away from the addition of a channel for the recovery of the debris.).

Gustafson states that the intended use of the disclosed method is to produce a rugged and durable device suited for use on surfaces such as roads and runways, which are substantially planar. Modifying the method of Gustafson to employ the flexible lens/cover of Parker would result in a

mechanically flexible device similar to those devices that Gustafson indicates are unsuitable, in the Background of the Invention section of Gustafson's disclosure.

Applicants positively recite a method for fabricating a lighting device that can conform to a non planar surface. The method requires the use of a flexible substrate, and a flexible light transmissive cover. The Examiner improperly asserts that Gustafson discloses an equivalent flexible light transmissive cover. In fact, Gustafson explicitly discloses that the light transmissive cover fully encapsulates the flexible substrate, and that the light transmissive cover must be mechanically strong enough to protect the LEDs from mechanical damage due to excessive loads. The specific materials disclosed by Gustafson include Surlyn® polymers from Dupont, and polychlorotrifluoroethylene (PCTFE). In applicants' prior response, applicants pointed out the flexural modulus of these materials is comparable to that of *rigid* polyurethane. Dupont describes Surlyn® as being tough, abrasion resistant, scuff resistant, and chemical resistant (http://www.dupont.com/industrial-polymers/surlyn/H-80035-1.html). However, *flexible* is not a term one skilled in the art would use to describe Surlyn®. Significantly, Dupont also manufactures flexible polymers, under the name Pyralux®. Dupont describes Pyralux® as being offered by the DuPont Flexible Materials Group, which develops, manufactures and markets flexible, solderable, metal clad laminates, coverlays, and bonding adhesives for the fabrication of thin, solderable, high density electrical interconnects used to make circuitry for single and double-sided, multilayer flex and rigid-flex applications (http://www.dupont.com/fcm/products/pyralux.html). Notably, Surlyn® is not a product offered by DuPont's Flexible Materials Group. There is simple no basis for concluding that Gustafson discloses or suggests the use of a flexible, light transmissive cover. Finally, Gustafson explicitly discloses inserting the light bar into a protective track made of high density plastic or aluminum, which clearly is not flexible.

Because there is no basis for concluding that the lighting bar disclosed by Gustafson is flexible or includes a flexible cover like the light panel recited by applicants' claims, and modifying Gustafson to achieve a flexible light panel or flexible cover is contrary to the stated purpose and use of Gustafson, the combination of art suggested by the Examiner does not render Claim 13 unpatentable. Accordingly, the rejection of Claim 13 and it's dependent claims should be withdrawn. Claims Objected to by the Examiner

The Examiner has objected to Claim 6, noting that it would be allowed if rewritten to include all elements of the base claim and any intervening claims. Because the prior amendment distinguished Claim 1 over the cited art, Claim 6 is patentable for at least the same reason as Claim 1,

and applicants elect to not rewrite Claim 6 in independent form at this time.

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In consideration of the preceding Remarks, it will be apparent that all claims in this application are patentable. The Examiner is therefore requested to pass this application to Issue without further delay. In the event that any issues remain unresolved, the Examiner is invited to telephone applicants' attorney at the number listed below.

Respectfully submitted,

Ron Cenderson

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I hereby certify that this correspondence is being deposited with the U.S. Postal Service in a sealed envelope as first class mail with postage thereon fully prepaid addressed to: Commissioner of Patents and Trademarks, Arlington, VA 22202, on May 9, 2002.

Date: May 9, 2002

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